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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/085,204	02/26/2002	Takuro Sekiya	220103US2	8688

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EXAMINER	
MENEFEE, JAMES A	
ART UNIT	**PAPER NUMBER**
2828	

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/085,204	SEKIYA ET AL.	
	Examiner	Art Unit	
	James A. Menefee	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-62* is/are pending in the application.

4a) Of the above claim(s) *9-62* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6-8* is/are rejected.

7)☒ Claim(s) *1-5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

In response to the amendment filed 6/16/2004, the specification and claims 1, 18, 37, 40, 43, 46, and 49 are amended. Claims 1-62 are pending.

Election/Restrictions

Claims 9-62 remain withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 8/29/2003. The examiner provides further clarification of the status of the withdrawn claims.

Note that claim 1 is designated below as containing allowable subject matter and would be allowable subject to the correction of the minor grammatical error in the claim. Claim 1 is generic to independent claims 18, 37, 40, 43, 46, and 49, and thus upon allowability of claim 1 these claims and their dependent claims will also be allowed. Note that these claims also include the same error as claim 1 and must also be amended for the same reason.

Claim 6 is currently being examined and is generic to independent claims 24, 38, 41, 44, 47, and 50. Thus, should the rejection to claim 6 be overcome and claim 6 become allowed, these claims and any of their dependent claims would also be allowable. Applicant is reminded that should claim 6 be amended then these other claims should be similarly amended if claim 6 is to remain generic.

Note that independent claims 9, 28, 39, 42, 45, 48, and 51-62 do not include all of the limitations of presently amended claim 1, therefore claim 1 is not generic to these claims. Thus these claims will not be allowed upon allowance of claim 1.

Claims 1-8 are subject to examination on the merits.

Claim Objections

Claims 1-5 are objected to because of the following informalities: in claim 1 line 8 (i.e. the newly added limitation) the term "uniform a compositional" should be changed to "uniform as compositional." Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation that the thickness of the material layer is less than ($50\lambda - 15$) nm, where λ is the tuning wavelength of the DBR. However, it is not clear what thickness the applicant desires. From earlier in the claim, λ is at least 1.1 μm, which is 1100 nm. Since the result is in nanometers, then the relevant variable must be in nanometers. Thus, this formula will amount to at least 50*1100 – 15 which is at least around 55000 nm. This is a large deviation

from what is claimed elsewhere, and it is believed that the formula should instead read less than $(0.05\lambda - 15)$.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohiso et al. (US 5,864,575). See especially col. 3 line 42 – col. 4 line 18, Figs. 5A, 9A and the discussion thereof, and claims 1-2.

Ohiso discloses a DBR comprising a first semiconductor layer having a first refractive index, a second semiconductor layer having a second refractive index lower than the first refractive index, the semiconductor layers being alternately stacked. There is a material layer between the first and second semiconductor layers having a third refractive index intermediate between the first and second refractive indices. The DBR is tuned to 1.55 μm, which is a wavelength greater than 1.1 μm. The material layer (col. 4 lines 13-18, claim 2) is disclosed as having a thickness less than that of the semiconductor layers. The semiconductor layers have a thickness of $(1.55\ \mu m / 4\eta)$; the refractive indices of these layers will be around 3 to 4 (depending on Al content) and thus the thicknesses of the semiconductor layers should be around 95-130 nm. Thus, the thickness of the material layer must be less than 95-130 nm. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie

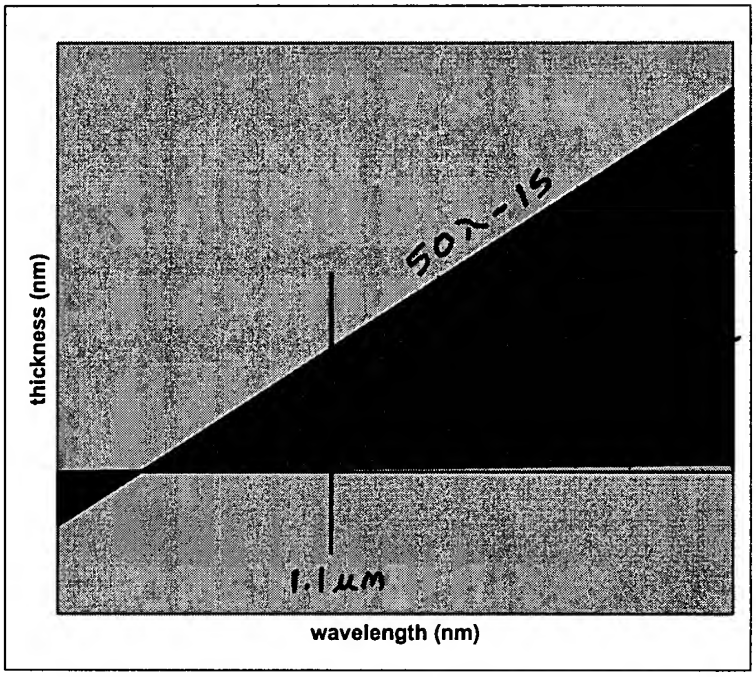
case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Thus, there is a *prima facie* case of obviousness for the thickness of the material layer in the ranges claimed by applicant, since the claimed ranges lie inside the range of less than around 95-130 nm.

Response to Arguments

Applicant's arguments filed 6/14/2004 have been fully considered but they are not fully persuasive. The arguments incorporate the content of the interview conducted May 5, 2004 where the examiner agreed that the proposed amendment to claim 1 and the original claim 6 were distinguished from Ohiso. Applicant's arguments regarding claim 1 are persuasive, see *Allowable Subject Matter* below. After further consideration, applicant's arguments regarding claim 6 are not persuasive; the examiner erred in stating during the interview that claims 6-8 as allowable over Ohiso, because the examiner's broadest reasonable interpretation of the claim is not consistent with the applicant's arguments, as explained below.

Applicant argued that claim 6 is distinguishable from Ohiso because claim 6 requires the thickness to fulfill a linear relationship (i.e. $y = mx + b$). However, applicant's argument is incorrect. The claim only requires a thickness $< 50\lambda - 15$. This does not require a linear relationship to hold between the thickness and the wavelength. This wording of the claim only requires the thickness to fall below the $50\lambda - 15$ line. For example, see the graph on the following page. Ohiso's thickness, as noted above in the 103 rejection, is disclosed to be less than around 95-130 nm. Even taking into account the proposed amendment to correct this

equation (discussed below), this range clearly overlaps with the claimed range as noted in the 103 rejection.



In total, the claim requires the wavelength to be greater than 1.1 microns and the thickness to be less than the 50 λ – 15 line. The claim does not require a linear relationship, only a thickness that falls into the hatched region of the graph above.

The examiner has a further problem with the claimed equation. Again, as noted in the 112 rejection above, it is believed that this equation is incorrect, regardless of the fact that 50λ – 15 is disclosed in the specification. The applicant is mixing units in the equation, which leads to a confusing result. The examiner contends that this equation does not properly convey the intended meaning of applicant's invention. Table 2 on page 85 clearly shows the applicant's intention is for 1.1 μm wavelength to correspond to 40 nm thickness, for 1.3 μm to correspond to 50 nm, and so on. Page 85 lines 20-21 clearly state that the thickness and wavelength are to be in

nanometers. Converting to nanometers, the wavelengths of Table 2 become 1100 nm, 1300 nm, 1500 nm, and 1700 nm. Plugging into the equation gives:

$50*1100 - 15 = 55000 - 15 = 54985$ nm thickness

$50*1300 - 15 = 65000 - 15 = 64985$ nm thickness

$50*1500 - 15 = 75000 - 15 = 74985$ nm thickness

$50*1700 - 15 = 85000 - 15 = 84985$ nm thickness

These thicknesses are one thousand times the intended thicknesses listed in Table 2. Thus it is proposed that to correctly claim the invention applicant must change the equation to:

$0.05\lambda - 15$

This should be changed in both the claims and in the specification. This will not be deemed new matter because it is a clarification of a clear mathematical error understood by one skilled in the art.

If the applicant still insists that the equation is to be as currently claimed and as in specification page 85, then it will be impossible for this limitation to distinguish from Ohiso. If the equation is not changed, and since the claims require λ to be at least 1100 nm, then the claims will require $t < 50*1100 - 15$ which is $t < 54985$ nm. Ohiso's thickness will never fall outside of this range, since Ohiso contemplates a thin film, a thickness of less than about 95-130 nm as shown in the 103 rejection above.

Allowable Subject Matter

Claims 1-5 are objected to because of the minor informality above, but would be allowable if this informality is corrected. The following is the examiner's reasons for indicating allowable subject matter:

There is not taught or disclosed in the prior art a DBR including inter alia a material layer as claimed where the thickness is such that a reflectance change rate is substantially uniform as compositional gradation layer thickness increases (see the linear portion of Fig. 19).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (571) 272-1944. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JM
July 23, 2004

MINSUN OH HARVEY
PRIMARY EXAMINER